

California.—Poway, Los Angeles and San Diego, 8th.

Nebraska.—North Platte, 12th.

Nevada.—Carson City, 1st, 8th.

Texas.—Fort Stockton, 21st.

Utah.—Salt Lake City, 7th, 16th.

MIRAGE.

Toledo, Ohio.—On the morning of the 6th the river presented a beautiful appearance from the effects of a distinct mirage. The Wheeling and Lake Erie railroad bridge loomed up through the mist in large proportions; and while it is two miles distant it did not appear to be more than one-half mile. The hulls of two vessels lying behind the Ohio Central wharf, on the east side of the river, were seen from this side of the river as though no object intervened.

Webster, Day county, Dakota.—At sunrise on the morning of the 11th a beautiful mirage was observed. The distant hills and other objects, ordinarily invisible, were apparently lifted into the range of vision, and the sun appeared in five pieces. The phenomenon lasted two hours.

Huron, Dakota.—A remarkably fine mirage was observed here between 8 and 9.30 a. m. of the 25th. The Wessington hills, thirty miles southwest of here, appeared to be only about three or four miles distant, presenting a palisade-like front several feet in height. The town of Wessington Springs, on the eastern slope of the hills, was clearly outlined. Houses and barns many miles away, and not ordinarily visible with the aid of a glass, were plainly seen, a number appearing in inverted positions.

MISCELLANEOUS PHENOMENA.

In the REVIEW for November, 1883, under the heading "miscellaneous phenomena," was published a summary of the reports received from the regular and voluntary observers of the Signal Service, relating to the unusual phenomenon, at sunrise and sunset, which has been so extensively observed in this and other countries. These remarkable sunsets were reported by observers during the preceding months, but owing to the limited number of observers reporting them their reports were not considered of sufficient importance to publish. In this REVIEW will be found the reports received during the previous months. They are as follows:

Alabama.—Montgomery, October 14th: the western sky presented a very peculiar appearance at sunset.

Arizona.—Fort Grant, October 23d: the sunset of this date was peculiar and beautiful; the western sky was filled with well-defined cirro-stratus clouds; at sunset these clouds were brilliantly illuminated, presenting a variety of color rarely seen.

Yuma, October 19th: for one and one-half hours after sunset the western sky was of a rich, blood-red color, which gradually faded away. The same appearances were noted on October 20th and 21st.

California.—Cape Mendocino, August 23d: a red sunset, preceded by unusual peculiarities of cloudiness, was observed here on this date.

San Diego, October 30th: a brilliant reflection in the western sky was visible for some time after sunset.

Florida.—Pensacola, October 8th: at sunset the sky was of a brilliant, luminous red, resembling the reflection from a vast fire, lasting for a considerable time after sunset. On October 9th, preceding sunrise, the sky was of a bright red color, reaching an altitude of about 30°.

Georgia.—Atlanta, October 30th: at sunset the whole heavens were of a dull, reddish hue. A peculiar, yellowish sunset was observed on October 31st.

Indiana.—Logansport: a yellow sunset, with a peculiar band of light of the same color, changing to dark red, was observed on August 13th.

Kansas.—Wellington, Sumner county, October 28th: a bright red sunset was observed.

Massachusetts.—Somerset, Bristol county: during September and October numerous beautiful autumnal sunsets were observed.

North Carolina.—Charlotte, October 30th: a brilliant sunset was observed, followed by an intensely red light, resembling the reflection from a vast fire.

South Carolina.—Stateburg, Sumter county: brilliant, red sunsets were observed on October 30th and 31st.

Tennessee.—Memphis: brilliant, rosy sunsets were observed on October 29th, 30th, and 31st; they were at first thought to be the reflection from a large fire.

Nashville, August 22d: a beautiful sunset was noted. On September 5th and 6th the sunset shadows were very bright. On October 7th they were again very bright and distinct. The sunset of October 29th was unusually brilliant, being of a bright red color, which remained visible until 6.40 p. m. A similar sunset was also observed on the 30th.

Virginia.—Lynchburg: shortly after sunset on October 30th and 31st the western sky presented a hazy and rose-tinted appearance, extending upward 45°, and resembling the zodiacal light.

The following reports relative to this phenomenon were received from the various states and territories for the month of December:

Alabama.—Auburn, Lee county, 1st: a remarkable sunset.

Arizona.—Fort Bowie: red sunsets on the 11th, 17th, and 27th.

Arkansas.—Fort Smith: at sunset of the 6th a peculiar, greenish tinge was noticeable in the western sky, gradually increasing in extent and changing to a deep red color. The illumination continued for one hour after sunset. Similar appearances were observed on the 7th, 8th, 14th, and 26th.

Fayetteville, Washington county, 31st: a remarkable redness of the sky, continuing for some time after sunset, was observed on almost every evening during the month.

California.—Princeton, Colusa county, 18th: the red sunsets prevailed during a part of the month and were exceedingly brilliant, the weather being entirely clear. A whitish light was also observed to precede the rising moon.

Hydesville, Humboldt county, 31st: December was characterized by red skies, which, during the latter part of the month, were observed both before sunrise and after sunset. These conditions were observed on the 1st, 2d, 4th, from 6th to 21st, and 31st. On the last date the display was very beautiful, the entire heavens having been covered with small cumulus and cumulo-stratus clouds, which were of bright orange colors, with a back-ground of deep blue.

Red Bluff, 31st: the month has been noted for its numerous brilliant sunsets.

Los Angeles: the sunsets of the 11th, 28th, and 29th were remarkably brilliant.

Cape Mendocino, 31st: many beautiful sunsets were observed here during the month; that occurring on the 18th being the most brilliant.

Central America.—The following extract is taken from a communication of Dr. Earl Flint, of date January 3, 1883, Rivas, Central America:

I see no notice yet about the cause of the blue appearance of the sun—red in early morning. It was noticed in many parts of South America during the last of August and the fore part of September. It was different from that of the red light observed here late in November, attributed by Professor Brooks to meteoric showers.

Colorado.—Golden, Jefferson county: a deep crimson light was observed in the western sky in the evening from the 9th to 14th, 16th, 20th, 23d, 24th, 25th, 28th, 29th, 31st. On the last date the glow was very noticeable long after the sun's disappearance. From 5.15 to 5.25 p. m. this coloration extended over fully 80° of the sky, and the new moon, a faint crescent, appeared tinged with green.

Fort Collins, Larimer county: brilliant sunrises and sunsets were observed on the 4th, 10th, 25th, and 28th.

Connecticut.—Voluntown, New London county: a very brilliant sunset was observed on the 29th.

Dakota.—Webster, Day county, 31st: during the last eighteen days of the month the morning twilights were wonderfully bright, lighting the whole landscape with a fiery red color.

The evening twilights of the same dates were equally remarkable.

Vermillion, Clay county, 31st: the peculiar glow in the west after sunset has been very noticeable during December. On several evenings the light has been so bright as to cast decided shadows two hours after sunset.

Fort Yates: at sunset on the 1st the western horizon was beautifully illuminated as if by an extensive prairie fire. The same phenomenon was seen on the 2d and 4th.

Huron, Beadle County: a very red sunrise and sunset were observed on the 10th.

Delaware.—Saint George's, New Castle county, 31st: the red sky after sunset has been very noticeable during December. It was especially bright on the 29th. This peculiarity in the appearance of the sky has been observed at intervals since November 24th, the centre of the light not being at the point where the sun sets, but between the north and west.

Florida.—Archer, Alachua county: a bright appearance of the eastern sky preceded the rising sun from one to two hours from the 1st to 7th, 11th, 29th, and 30th. On the evenings from the 17th to 23d and 27th the same peculiarities were observed in the western sky.

Mayport, Wakulla county: on the evening of the 28th the western sky was of a deep red color, which resembled the light from an extensive forest fire.

Georgia.—Andersonville, Sumter county: the sun at sunset on the evenings of the 4th and 5th was of a deep orange color. For an hour before sunrise on the 6th the eastern sky was of a brilliant orange color. At sunset of the 23d the sky was unusually brilliant in all directions, the light in the western sky extending almost to the zenith.

Quitman, Brooks county: on the evening of the 22d the after glow was very noticeable. An unusually bright light also preceded the rising sun.

Illinois.—Chicago: brilliant sunsets were observed on the 11th and 28th.

Swanwick, Perry county, 31st: the red sunrises and sunsets have been the most important feature of the month.

Peoria, Peoria county: on nearly every evening from the 14th to 25th the western sky was illuminated with a fiery red color.

Edgington, Rock Island county, 31st: during the past month the evening twilights were remarkable for their brilliancy.

Mattoon, Coles county: unusually bright twilights were frequently observed during December.

Collinsville, Madison county: the sunrises and sunsets on all days of the month were remarkable for their red appearance.

Indiana.—Sunman, Ripley county: brilliant sunset was observed on the 28th, the sunrise of the following morning being of a similar appearance.

Vevay, Switzerland county: brilliant, rosy sunrise and sunset were observed on the 28th.

Laconia, Harrison county, 31st: beautiful sunrises and sunsets were observed during the entire month.

Wabash, Wabash county: very bright sunsets were observed on the 9th, 10th, 11th, 12th, and 28th.

Iowa.—Keokuk, 9th: for several days past the sky has been remarkably red for one and one-half hours before sunrise and after sunset. Bright sunsets also occurred on the 24th, 25th, 27th, and 28th.

Oskaloosa, Mahaska county: red sunsets were observed on the 1st, 4th, 5th, and 11th.

Humboldt, Humboldt county: bright lights appeared in the western sky after sunset from the 24th to the 28th; on the mornings of the 27th and 28th the same light preceded sunrise.

Muscataine, Muscatine county: bright red sunrises and sunsets were observed on seventeen days during December.

Monticello, Jones county: the same bright appearance of the sky at sunset and sunrise that was seen during the latter part of November continued until the middle of December.

Kansas.—Leavenworth: brilliant sunsets occurred on the 3d, 4th, 7th, 8th, 9th, 24th.

Manhattan, Riley county: a bright appearance of the sky was observed before sunrise and after sunset of the 9th; the same phenomenon was also observed during the early morning of the 10th and on the evenings of the 26th and 27th.

Fort Scott, Bourbon county: unusually red sunrises and sunsets occurred on the 1st, from the 7th to 10th, 14th, 15th, 17th, 27th, and 28th.

Pretty Prairie, Reno county: a brilliant appearance of the western sky was noted on the 26th, 28th, and 29th.

Elk Falls, Elk county, 31st: the latter part of the month was characterized by remarkably red sunrises and sunsets.

Wellington, Sumner county: remarkable twilights were apparent on all clear and partly clear days of the month; they were noted on the 3d, 5th, 7th to 12th, 14th, 15th, 16th, and from 24th to 30th. The evening twilights were of a dark red color, and continued for one and one-half hours after sunset. In the mornings the colors were considerably lighter, but they appeared about the same length of time before sunrise. Those observed on the 27th and 28th were the most brilliant of the month.

Clay Centre, Clay county: for some time before sunrise on the 15th the sky presented a crimson appearance.

Topeka, Shawnee county, 31st: the red and orange tints which have been so noticeable for some time past, before sunrise and after sunset, were observed throughout December.

West Leavenworth: on every clear evening during December the sunsets were, without exception, tinted with a peculiar, golden glow. The same conditions were also observed at sunrise. These peculiarities were observed on twenty-one days during the month.

Maine.—Portland: a very peculiar, and most beautiful, sunset was observed on the 28th. It was similar in character to that observed on November 27th. The western horizon was of a dark crimson, shading off to a delicate rose-color at the zenith.

Eastport: a red glow in the western sky, lasting one hour after sunset, was observed on the 29th.

Maryland.—Woodstock, Harford county: before sunrise on the 2d a peculiar glow extended around the entire horizon and upward to a considerable height. A similar phenomenon was also observed on several days preceding that date.

Sandy Springs, Montgomery county, 31st: the peculiar, red light after sunset and before sunrise still continues.

Baltimore, 28th: the western sky was luridly ablaze from sunset (at 4.44 p. m.), until nearly 6.30 p. m.

Massachusetts.—Boston: at sunset of the 7th a peculiar glow was noticeable in the northwestern sky.

Taunton: the sunset of the 3d was very brilliant, but not so marked as that of November 30th. On the evening of the 9th the whole sky was covered with cirro-cumulus clouds which were beautifully tinted. In the west the color was very bright but it gradually faded toward the zenith.

Fall River: an after-glow of an intensely red color was observed on the afternoon of the 28th, which was the most brilliant of the sunset displays that have been observed at this place. The morning dawn of the 29th was equally as brilliant as the sunset of the preceding day.

Somerset, Bristol county: Mr. Elisha Slade reports that during the months of November and December a series of brilliant sunsets, and no less brilliant sunrises, were observed, which for displays of color and duration are unprecedented. These remarkable displays began on November 3d—no two consecutive mornings or evenings presenting the same phenomena in all the respective phases. During November the appearances were observed daily from the 3d to 11th, 13th, 25th, and 27th. The display of the 27th was longer than any previously observed. On that evening it consisted of an intense and steady light; and at 5.20 p. m. it was so bright that it was not difficult to read common print by it.

The morning of December 3d showed a wonderful change in the series of displays. The twilight bands were intensified beyond any previous degree, and were as clearly defined as the solar spectrum. Red, orange, yellow, and green bands

appeared in regular order and of extreme width, the display terminating with the appearance of a green sun. The evening display of the 3d was in silver and gold colors. The morning of the 4th was a repetition of that of the 3d. The evening of the 12th gave a scarlet light of nearly two hours duration; and the evenings of the 28th and 29th were of rose color. Mr. Slade further remarks: "in observing this series of meteorological phenomena, I noticed that if there was a rosy tint in the sky from 20° to 30° above the sun a few minutes before sunset, the display after sunset was red, crimson, or scarlet; if the sky was of a grayish white before sunset, the exhibit after sunset was of a silvery color; if the sky had a green tint previous to sunset, it afterwards changed to yellow; if purple, it changed to orange or gold; if blue, the color and shading were afterwards more variable. The evening twilight curve was dimmed or obliterated."

Michigan.—Detroit: a beautiful illumination in the eastern sky preceded the rising sun on the 9th. On the evening of the 28th the whole western sky was of a dark green color, interspersed with occasional patches of light.

Hillsdale, Hillsdale county: from the latter part of November until December 12th there were beautiful, flaming skies in the west at sunset, and from December 3d to 10th the same was observed in the east before sunrise.

Hudson, Lenawee county: unusually bright colors in the western sky were observed at sunset on numerous dates during December.

Minnesota.—Saint Paul: before sunrise on the 9th the entire eastern sky presented a luminous appearance. A bright red segment was also observed along the western horizon immediately after sunset of the same date. Similar conditions were also observed on the evenings of the 10th, 11th, 12th, 16th, 24th, 26th, 27th.

Missouri.—Concerning this phenomenon, Professor Francis E. Nipher, director of the "Missouri Weather Service," in his report for December, 1883, furnishes the following:

The beautiful illumination of the sky after sunset and before sunrise has continued during the month, having been observed whenever the clouds did not prevent. This phenomenon was first observed in the tropics, immediately after the great earthquake at Java, August 26th and 27th, which seems to have been the most violent one occurring during historic times. In the equatorial regions the illuminated sky, at high altitudes, was accompanied with the phenomenon of a green coloration of the sun. The latter phenomenon may be produced by a large excess of humidity, as is well known. At Ootacamund, in the Neilgherries, a gentleman "distinctly saw a green cloud-like mist pass across the sun, and then one of a reddish color, and the sun took the color of each of these clouds." The green sun was very marked in India, and caused great alarm. The red sky and green sun were seen in the West Indies and Panama on the 2d and 3d of September. On the 10th the red sky and green sun were seen in India. September 15th the phenomenon was seen in South Australia. September 21st it was seen at the Cape of Good Hope, November 9th in England, and by November 23d it was generally observed in Missouri and the northwestern states. Meteorological stations at high altitudes are now making observations for volcanic dust, which was thrown out from the mountain of Krakatowa in enormous quantities, with a view of determining whether the red sky is due to the presence of this dust. As the phenomenon seems to have extended from the East Indies westwardly around the equatorial belt and then spread gradually to the south and north, it is possible that volcanic dust has caused the phenomenon.

Nebraska.—Johnson, Nemaha county, 31st: for the past three weeks the western sky has presented a very brilliant appearance.

Red Willow, Red Willow county: a bright glow after sunset was observed on the 20th and before sunrise of the 21st; also on the 27th and 28th.

Genoa, Platte county: the last week of November and first ten days of December were remarkable for the brilliant, red glow in the sky after sunset and before sunrise. On several occasions the light assumed the peculiarities of the aurora.

Stella, Richardson county: the most remarkable phenomenon of the month was the red sky after sunset, lasting on several occasions from thirty-five to forty minutes longer than the ordinary twilight.

Nevada.—Carson City, Ormsby county: a beautiful sunset was observed on the 25th.

New Hampshire.—Grafton, Grafton county: remarkable sunsets were noted on the 10th, 20th, 28th and 29th.

Mount Washington: a beautiful, red sunset was observed on the 2d.

New Jersey.—Barnegat City: an hour after sunset on the 21st the western sky assumed a blood red color, which remained in view for a long interval afterwards. Similar appearances were also observed on other dates during the month.

Moorestown, Burlington county, 31st: the sunsets during December were marked by unusually bright colors, those of the 26th and 28th being especially brilliant. Preceding the sunrise of the 29th, the eastern sky presented a similar appearance to that observed during the evenings of the above dates.

South Orange, Essex county, 31st: the remarkable sunsets continued throughout December.

New York.—Poughkeepsie: the display of the crimson sky on the 28th was the grandest yet noticed at this place. Just after sunset the bright crimson illumination extended from the horizon to a quarter of the way up to the zenith and south along the crests of the mountains to the highlands. The upper margin was of a light pink hue edged with green, and blending further upward with the deep blue of the sky.

Rochester: an unusually brilliant sunrise occurred on the 13th. The red light appeared at 5.40 a. m., and at 6 a. m. it extended to the zenith and attained great brilliancy.

Buffalo: the sunset of the 5th was of unusual brightness.

Albany, 31st: the unusual sunset glow observed during November was also observed during December on the following dates: 2d, 3d, 12th, 21st, 28th; the sunrises of the 1st, 3d, 4th, 7th, 16th, 20th, 22d, were of similar appearance.

Ithaca, Tompkins county: a very bright sky was observed in the southwest from 6 to 6.15 p. m. of the 25th.

Friendship, Allegheny county: the eastern sky before sunrise on the 29th was unusually brilliant.

Humphrey, Cattaraugus county, 29th: a very red sunset occurred.

Ardenia, Putnam county: the sunsets during the latter half of the month were remarkable for brilliancy, diversity of colors, and long duration.

North Carolina.—Brevard, Transylvania county: a brilliant twilight, blended with orange, yellow, and pink colors, was observed on the evening of the 25th.

Ohio.—Ruggles, Ashland county: very red skies before sunrise and after sunset were frequently observed during the month. Those observed on the evening of the 10th and the morning of the 13th were especially bright.

Cleveland: unusually red skies during the evening were seen in the west on the 2d, 9th, 10th, 11th, 28th; the same peculiarity was seen in the east on the 2d, 10th, 12th, 13th, 29th, and 30th.

The following extract is taken from the December report of the "Ohio Meteorological Bureau," Professor T. C. Mendenhall, director:

The unusual displays of color following the setting and preceding the rising of the sun, which were referred to in the last report, have continued to attract the attention of the observers during December.

Oregon.—Astoria, Clatsop county: brilliant sunsets were noted on the 12th, 13th, 14th to 17th.

Portland: bright-red sunsets were noted on the 1st, 2d, 3d, 5th, 6th, 7th, 9th, 10th, 11th, 13th, 15th, 16th, 18th.

Albany, Linn county, 31st: for the past five weeks the peculiar, lurid sunsets have been of frequent occurrence.

Pennsylvania.—Leetsdale, Allegheny county: the remarkable appearance of the western sky at sunset, as reported from this place during November, was also observed December 9th and 28th, that on the latter date having been especially bright.

Wilkesbarre, Luzerne county: a brilliant appearance of the western sky was observed on the 9th, the light reaching almost to the zenith. On the evening of the 11th the whole sky was tinted with red. The phenomenon appeared with varying brilliancy on the 12th, 13th, 28th; on the last date the display was extremely bright.

Fallsington, Bucks county: very bright, red and yellow sunrises and sunsets were frequently observed during the month.

Tennessee.—Hon. A. J. McWhirter, Commissioner of Agriculture and Director of the "Tennessee Weather Service," in report for 1883, reports as follows:

The red and yellow sunsets, which were such a feature during November, continued to be observed during December, and were most marked in brilliancy and depth of tint about the time of, or just preceding, the cold wave of the 15th *et seq.* Special mention of these phenomena was made as follows: At Parksville, on the 1st, 2d, 15th, 25th, and 26th; at Manchester, very brilliant on the 15th and 25th; Franklin, during the fair days; Chuckaluck, on the 15th and at sunrise on the 2d; Grief, at sunrise and sunset on all fair days; Trenton, on the 14th and 15th, at sunrise deeply tinged with yellow, on the 23d and 27th at sunset, and on the 16th and 29th at sunrise; at Hardison's Mills, on the 8th, 11th, and 12th, at sunset very deeply tinged, and 17th, 18th, 26th, 27th, 28th and 29th at sunrise and sunset.

Utah.—Salt Lake City, 31st: during the early part of the month the sunsets presented a remarkable appearance. An intensely red glow overspread the western sky, at times reaching to the zenith. It had the appearance of the light from an immense fire, and attracted great attention.

Vermont.—Strafford, Orange county: the sunsets on the 28th and 29th were of a bright red color, extending from northwest to southwest and to an altitude of 45°.

Charlotte, Chittenden county: the sky in the west and southwest exhibited an unusual redness on the evenings of the 28th and 29th.

Dorset, Bennington county, 31st: numerous, bright sunrises and sunsets were observed during the month.

Virginia.—Lynchburg: a reddish glow appeared in the western sky after sunset on the 2d, 5th, 17th, 21st, 26th, 28th.

Washington Territory.—Bainbridge island, Kitsap county: the mornings and evenings of nearly the whole month were characterized by brilliant, red sunrises and sunsets, the entire concave of the heavens being overspread with the illumination. Even in rainy and cloudy weather, when the sky was obscured, the beautiful, red lights penetrated through the clouds.

Spokane Falls, Spokane county, 26th: very peculiar lights have been observed in the eastern and western skies during the past few days, preceding sunrise and following sunset. The display on that date was especially bright, the western sky being illumined with a variety of colors.

Wisconsin.—Sussex, Waukesha county: for one and one-half hours before sunrise on the 9th the eastern sky was covered with a bright red light which extended to an altitude of 45°, and resembled the light from an extensive fire. The same phenomenon was observed on the morning of the 10th and after sunset of the same date.

Neillsville, Clark county, 31st: the brilliant sunrises and sunsets have attracted much attention. They were frequently observed during the month, the light reaching nearly to the zenith. The morning displays were apparently of greater brilliancy than those observed after sunset.

La Crosse: the sunset of the 14th was very brilliant, and of a deep red color; also on the 27th and 28th.

• Rev. Ph. Borrello, S. J., co-operating observer at Gozo, an island near Malta, Mediterranean sea, reports that a great light of red, mixed with other colors of the rainbow, was noticed before sunrise and after sunset over almost all Italy on November 28th, 29th and 30th, and almost throughout the month of December. The rays of the sun during the day were pale and light, and in the morning and toward evening they were of orange and red colors.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and fifty-six stations show 4,754 observations to have been made, of which five were reported doubtful; of the remainder, 4,749, there were 4,036, or 85.0 per cent., followed by the expected weather.

SUN SPOTS.

The following record of sun spots for the month of December, 1883, made at the Lawrence observatory, Amherst, Massachusetts, has been forwarded by Prof. David P. Todd:

Date— Dec., 1883.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
1, 11 a. m.	1	2	0	0	1	2	3	15	
2, 3 p. m.	1	1	0	5	0	0	4	10	
3, 12 m.	0	0	0	4	0	0	3	5	
4, 11 a. m.	0	1	1	2	0	0	2	3	
6, 1 p. m.	2	6	1	2	2	6	2	6	
7, 4 p. m.	0	0	0	0	0	0	2	6	
10, 12 m.	4	45	0	0	0	0	6	50	Many of the spots small.
12, 11 a. m.	1	20	0	0	0	0	7	70	Do.
13, 11 a. m.	0	0	0	0	0	0	7	70	Do.
15, 2 p. m.	0	0	1	5	0	0	6	50	
16, 10 a. m.	0	0	0	0	0	0	6	50	
17, 4 p. m.	0	0	0	10	0	0	6	35	
20, 10 a. m.	2	20	0	0	0	0	3	35	
22, 11 a. m.	1	15	1	5	0	0	5	60	One of spots very large.
26, 8 a. m.	0	0	0	0	0	0	3	45	Do.
28, 9 a. m.	1	2	0	0	1	2	4	45	Do.
29, 10 a. m.	0	0	0	0	0	0	4	45	

Faculae were seen at the time of every observation. {Approximated.

Mr. William Powrie, at Sussex, Waukesha county, Wisconsin, reports having observed on the 25th a large spot on the sun, with the naked eye, and on viewing the sun through a nine-inch telescope, a group of six spots was observed in the southwest quadrant of the sun.

Mr. H. D. Govey, of North Lewisburg, Champaign county, Ohio, reports that sun spots were observed on all clear days during the month; they were most numerous on the 21st; least numerous and smallest on the 5th; and largest on the 28th.

Wellington, Sumner county, Kansas.—On the 27th and 28th, a dark spot was observed on the sun, with the naked eye.

METEORS.

Woodstock, Harford county, Maryland.—A large and brilliant meteor, moving in a southwesterly direction, was observed at 8.59 p. m. of the 1st.

Lansing, Michigan.—At 11 p. m. of the 1st a large meteor was observed in the southern sky.

Indianola, Texas.—A brilliant meteor was seen in the southwestern sky at 6.20 p. m. of the 1st.

Alexandria, Harrison county, Dakota.—At 7.20 p. m. of the 9th a bright meteor appeared in the western sky and moved toward the south, its course not being in a direct line but having a succession of curves. It left a track which remained visible for several seconds after its disappearance.

Sussex, Waukesha county, Wisconsin.—Between 5.45 and 6 a. m. of the 11th a shower of meteors was observed falling in all directions. One as large as "Jupiter" was observed in the northern sky, and moving rapidly in an easterly direction; it disappeared when at about 20° from where it first appeared.

Variety Mills, Nelson county, Virginia.—At 6 p. m. of the 18th a meteor was observed to pass from near the zenith in a south-southwesterly direction. It increased rapidly in brilliancy and changed color during its flight.

Topeka, Kansas.—On the night of the 23d, while the moon was shining brightly, there suddenly appeared a bright light, resembling a flash of lightning, which vividly illuminated the surroundings. In the western sky was observed a long broad streak of light which remained for fully three minutes, and finally concentrated into a ball of light, apparently the size of the moon, which remained visible for more than ten minutes.

Oswego, New York.—A brilliant meteor is reported to have passed over the city of Auburn on the night of the 21st, which lighted up the streets brightly.

Wellsborough, Tioga county, Pennsylvania.—A large meteor passed over this place in a direction from northeast to southwest at 10 p. m. of the 28th.

Jacksonville, Florida.—A meteor of unusual brilliancy was observed at 12.05 a. m. of the 29th. It started from a point about 10° southwest of the zenith and moved slowly toward

the west-southwestern horizon, exploding when at an altitude of 20°.

Charleston, South Carolina.—At about 8.30 p. m. of the 30th a meteor passed over this city in a southeasterly direction, leaving behind it a long trail.

Meteors were also observed at the following places:

1st.—Springfield, Arkansas; Webster, Dakota; Griffin Station, Indiana; Davenport, Iowa; Clay Centre, Kansas.

2d.—Springfield, Arkansas.

3d.—Burlington, Iowa.

4th.—Davenport, Iowa; Rowe, Massachusetts.

8th.—Salina, Kansas.

11th.—Stateburg, South Carolina.

12th.—Yuma, Arizona; Alexandria, Dakota; Webster, Dakota; Fort Canby, Washington Territory.

17th.—Andersonville, Georgia; Liberty Hill, Louisiana.

18th.—Webster, Dakota; Davenport, Iowa.

20th.—Fall River, Massachusetts.

21st.—Somerset, Massachusetts.

24th.—Red Willow, Nebraska; Allison, Kansas.

25th.—Davenport, Iowa; North Volney, New York.

31st.—Beloit, Wisconsin.

EARTHQUAKES.

Lead Hill, Boone county, Arkansas.—A shock of earthquake occurred at Melbourne, Izard county, at 9.20 a. m. of the 5th. Apparently the shock came from the west or west-southwest. It was very distinct, causing buildings to shake, and was accompanied by a sound resembling distant thunder.

The following note is taken from the "New York Times" of December 7, 1883:

SAINT LOUIS, MISSOURI, December 6, 1883.—Seven shocks of earthquake occurred yesterday at Rovender Springs. They lasted forty seconds, and broke glass-ware and crockery in stores and dwellings. Large rocks were loosened and fell in the cuts of the Kansas City, Springfield, and Memphis railroad near Rovender Springs. The shock was accompanied by a loud noise, and there was a violent jar of the earth.

A similar report of the earthquake above referred to, with some verbal changes, the most notable being *severe* instead of *seven* in the first word, was published in the "New York Tribune" of the same date.

Los Angeles, California.—A slight shock of earthquake occurred here at 11.40 p. m. of the 12th. The vibration, which was distinctly felt, was of such short duration that its direction was not determined. On the 13th another slight shock of short duration occurred.

Poway, San Diego county, California.—A slight shock of earthquake occurred here at 3 p. m. of the 16th.

Lisbon, Portugal, December 23, 1883.—At 1.30 a. m. of the 22d a slight earthquake shock, which was not generally noticed, occurred here. At 3.30 a. m. a stronger shock, lasting twelve seconds and accompanied by heavy rumblings, awoke the entire population of the city. Some old buildings and a number of chimneys were damaged. At Setuval, eighteen miles southeast of Lisbon, it was so severe as to cause much alarm.

DROUGHT.

Andersonville, Sumter county, Georgia, 3d.—Serious drought prevails in this vicinity; springs are becoming dry that have not failed for many years.

Mayport, Duval county, Florida, 30th.—Vegetation in this vicinity is suffering in consequence of drought.

Montgomery, Alabama, 27th.—Some localities south of this city are still suffering from the late unprecedented drought. Catoma creek is so low that it may be forded at any point.

Jacksonville, Florida, 30th.—The strawberry vines in this vicinity have been seriously damaged by the prevailing drought. The crop is reported to be a failure.

Westborough, Worcester county, Massachusetts.—The past month has been very dry in this vicinity. Nearly all of the precipitation was in the form of snow. Many wells are dry and there is a scarcity of water for cattle.

Red Bluff, California, 31st.—The present season has been so dry that cattle and sheep have suffered in consequence of scarcity of water. Owing to the very dry condition of the soil many farmers were compelled to stop plowing and seeding. The rain of this season is less than half the amount of the corresponding months of 1882.

POLAR BANDS.

Lead Hill, Arkansas, 3d, 15th, 16th, 27th.

Los Angeles, California, 12th.

Archer, Florida, 6th, 15th, 16th, 19th, 24th.

Limona, Florida, 15th to 18th.

Pensacola, Florida, 13th, 15th.

Larchland, Illinois, 1st.

Riley, Illinois, 3d.

Salina, Kansas, 10th.

Gardiner, Maine, 4th.

Clear Creek, Nebraska, 12th, 13th, 16th.

North Platte, Nebraska, 20th.

Vineland, New Jersey, 1st, 13th.

Mountainville, New York, 4th.

Wauseon, Ohio, 3d, 10th, 11th, 20th, 26th, 29th.

Block Island, Rhode Island, 7th.

Nashville, Tennessee, 2d, 6th, 7th, 8th, 11th, 14th.

Wytheville, Virginia, 9th, 12th, 29th.

ZODIACAL LIGHT.

Little Rock, Arkansas, 8th, 12th.

Webster, Dakota, 23d, 24th, 26th to 29th.

Archer, Florida, 19th, 20th, 26th, 27th, 28th.

Pensacola, Florida, 1st, 12th, 13th.

Allison, Kansas, 30th.

Cambridge, Massachusetts, observed, 21st, 28th, 29th; suspected, 22d.

Escanaba, Michigan, 3d, 4th, 11th, 12th, 16th, 19th, 24th.

Brevard, North Carolina, 25th, 26th, 28th.

Nashville, Tennessee, 1st, 25th, 26th, 27th.

Wytheville, Virginia, 26th.

MIGRATION OF BIRDS.

Geese flying southward.—Cairo, Illinois, 18th; Chicago, Illinois, 4th, 16th; Cantonment, Indian Territory, 25th, 31st; Fort Madison, Iowa, 17th, 19th, 21st, 25th; Red Willow, Nebraska, 20th; Mountainville, New York, 1st; Narragansett Pier, Rhode Island, 2d; Point Judith, Rhode Island, 8th, 14th, 15th. *Flying northward.*—Cairo, Illinois, 20th; Fort Madison, Iowa, 15th, 18th.

Ducks flying southward.—Fort Smith, Arkansas, 23d; Augusta, Georgia, 16th. *Flying northward.*—Edgington, Illinois, 8th. *Flying westward.*—Fort Stockton, Texas, 17th.

PRAIRIE AND FOREST FIRES.

Fort Smith, Arkansas, 4th, 28th.

Fort Meade, Dakota, 12th.

Cantonment, Indian Territory, 26th.

Fort Reno, Indian Territory, 1st, 2d, 3d.

Elk Falls, Kansas, 28th.

SAND STORMS.

Fort McDowell, Arizona, 11th.

San Carlos, Arizona, 10th, 12th, 15th.

Yuma, Arizona, 12th, 20th.

Fort Reno, Indian Territory, 25th.

Fort Concho, Texas, 26th.

ERRATUM.

On page 1 of the November REVIEW, under barometric "departures from the normal values for the month", for from .01 to 0.3 above the normal in the south Atlantic and east Gulf states, read from .01 to .03.

NOTES AND EXTRACTS.

The following extract relating to the Java volcanic eruption and earthquake of August, 1883, is taken from the "New York Herald" of December 7, 1883: